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***Lake Thunderbird TMDL Monitoring Plan Implementation:  
Sample Year (SY) 2021- September Report***

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**SY2021 Monthly Report**

*Lake Thunderbird TMDL Monitoring Plan Implementation:*

*September 2021 Monitoring Report*

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Oklahoma Water Resources Board  
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## SUMMARY OF SEPTEMBER WATER QUALITY SAMPLING

Sampling for September 2021 occurred on the fourteenth and was considered a base flow collection. Water samples were collected at eight locations and a discharge measurement was collected at one location. Samples were not collected at LT-1 or TE-1 because of dry conditions. Mesonet data shows no precipitation on the fourteenth, in the 72 hours prior to sampling, or in the 72 hours after the sampling event. The total rainfall amount in Norman for the month of September was 0.43 inches. All water level gauges were operational for the month, except for JB-1 due to road construction. The gauge at LT-1 was removed in 2018 as a result of equipment malfunction. The equipment has not been replaced due to intermittent streamflow and dry conditions. Furthermore, this station is being reviewed for a possible location change.

## RESULTS

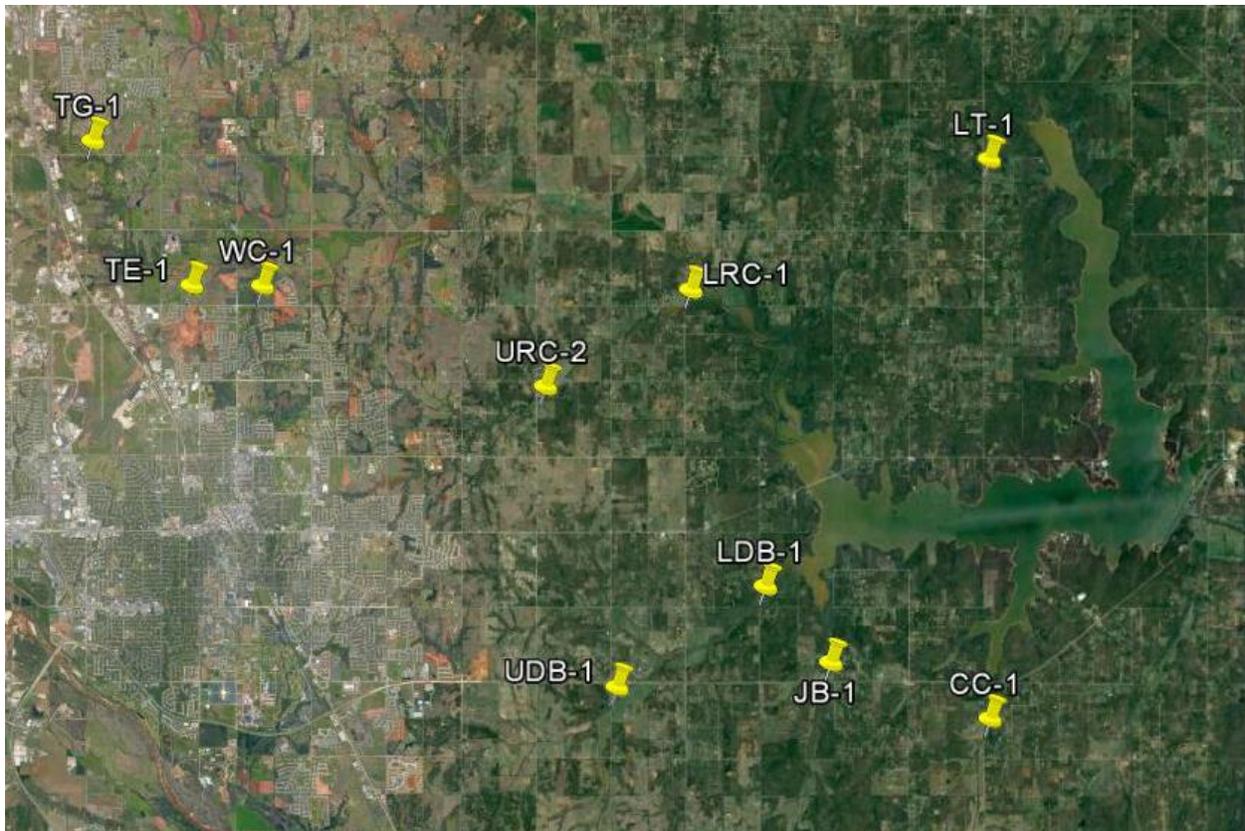


Figure 1 Monitoring Station Map

Monitoring Location ID	Monitoring Location Name	Date	Time	Field Crew	Water Temperature (°C)	Dissolved Oxygen (DO) (mg/l)	pH	Specific Conductance (mS/cm)	Turbidity (NTU)	Notes
CC-1	Clear Creek	9/14/2021	9:50	SD	22.08	6.79	7.87	696	11	Used RP3, narrow channel, low flow, not able to take flow measurement-too shallow; changed offset for DCP
JB-1	Jim Blue Creek	9/14/2021	11:10	SD	23.95	0.99	7.61	960	20	Gauge gone, still ongoing construction, trees gone; barely flowing/connected, lots of scum near bridge/farther downstream
LDB-1	Lower Dave Blue Creek	9/14/2021	11:50	SD	23.94	3.61	7.93	690	17	Low stage, some positive flow may have been from wind
LRC-1	Lower Rock Creek	9/14/2021	12:40	SD	23.52	8.23	7.87	745	14	Low visible flow, orifice clear
LT-1	Lake Laterals	9/14/2021	12:15	SD	N/A	N/A	N/A	N/A	N/A	Completely dry
TE-1	Little River Tributary	9/14/2021	15:15	SD	N/A	N/A	N/A	N/A	N/A	Downstream completely dry (starting under bridge), orifice out of water, upstream small disconnected pools, neither RP over water
TG-1	Little River Tributary	9/14/2021	16:00	SD	26.45	10.08	7.92	1037	3	Low water level/visible flow; orifice may have been partially covered by small gravel
UDB-1	Upper Dave Blue Creek	9/14/2021	8:55	SD	21.87	5.46	7.77	949	7	Bubbler probably clogged-reading 20 at arrival, 17.46 when leaving; some scum upstream of bridge, very low stage/visible flow
URC-2	Upper Rock Creek	9/14/2021	14:00	SD	25.20	11.05	7.62	872	14	Filamentous covering bubbler, orifice clear; some scum upstream of bridge, very low flow
WC-1	Woodcrest Creek	9/14/2021	14:40	SD	23.46	3.08	7.71	1032	14	Verified tapedown, orifice clear; very low water level/visible flow, barely connected under bridge; very scummy on ds, filamentous more common on us of bridge

Table 1 Field Data Form

Monitoring Location ID	Monitoring Location Name	Nitrate and Nitrite (mg/l)	Kjeldahl Nitrogen (mg/l)	Phosphorus (mg/l)	Total Suspended Solids (mg/l)
CC-1	Clear Creek	0.23	0.38	0.061	<5.0
JB-1	Jim Blue Creek	0.10	0.77	0.104	8.0
LDB-1	Lower Dave Blue Creek	<0.05	0.51	0.068	12.0
LRC-1	Lower Rock Creek	<0.05	0.22	0.036	6.0
LT-1	Lake Laterals	N/A	N/A	N/A	N/A
TE-1	Little River Tributary	N/A	N/A	N/A	N/A
TG-1	Little River Tributary	<0.05	0.30	0.038	<5.0
UDB-1	Upper Dave Blue Creek	<0.05	0.28	0.036	<5.0
URC-2	Upper Rock Creek	<0.05	0.37	0.042	8.0
WC-1	Woodcrest Creek	<0.05	0.45	0.094	10.0

Table 2 Laboratory Analysis Summary

Monitoring Location Name	Nitrate and Nitrite (mg/l)	Kjeldahl Nitrogen (mg/l)	Phosphorus (mg/l)	Total Suspended Solids (mg/l)
Field Blank	<0.05	<0.10	<0.010	<5.0
Duplicate	0.22	0.39	0.060	5.0
Duplicate RPD	4.44%	2.60%	1.65%	66.67%*

Table 3 QA/QC Data Where the Asterisk Denotes RPD 4

Quality assurance/quality control (QA/QC) of the data includes a field blank and duplicate sample from each collection event and is qualified by the OWRB. Relative Percent Difference (RPD) of the duplicate sample can be categorized into four levels, where Level 1 likely has no QA issues and Level 4 has major QA issues, and should be used with caution.

Monitoring Location ID	Monitoring Location Name	Discharge (cfs)	Stream Stage (ft)
CC-1	Clear Creek	0.30	20.39
JB-1	Jim Blue Creek	N/A	N/A
LDB-1	Lower Dave Blue Creek	1.63	16.01
LRC-1	Lower Rock Creek	0.57	4.13
LT-1	Lake Laterals	N/A	N/A
TE-1	Little River Tributary	N/A	N/A
TG-1	Little River Tributary	0.02	8.97
UDB-1	Upper Dave Blue Creek	0.03	17.10
URC-2	Upper Rock Creek	0.02	10.70
WC-1	Woodcrest Creek	0.01	7.37

Table 4 Station Discharge Summary

All rated stream discharges are provisional and subject to change.

**File Information**

File name: Lrc\_20210914-113311.ft  
 Start date and time: 9/14/2021 11:08 AM  
 Start location latitude: 35.261  
 Start location longitude: -97.335  
 Calculations engine: FlowTracker2  
 Data collection mode: Discharge

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**System Information**

**Discharge Summary**

Start time: 9/14/2021 11:09 AM    End time: 9/14/2021 11:28 AM  
 # Stations: 13    Avg interval: 40  
 Mean depth: 0.754 ft    Max depth: 1.000 ft  
 Mean velocity: 0.0634 ft/s    Max velocity: 0.0845 ft/s  
 Mean SNR: 39 dB    Total width: 12.000 ft  
 Mean temp: 75.371 °F    Total area: 9.0500 ft²  
 Wetted Perimeter: 12.349 ft    Total discharge: 0.5739 ft³/s

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**Discharge Uncertainty**

Category	ISO	IVE
Accuracy	1.0%	1.0%
Depth	0.4%	3.7%
Velocity	0.4%	6.4%
Width	0.2%	0.2%
Method	2.5%	
# Stations	3.9%	
Overall	4.8%	7.4%

## Discharge Measurement Summary

[Save PDF of summary](#)

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**Summary overview**

No changes were made to this file  
 Quality control warnings

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**Supplemental data summary**

Gauge height time	Gauge height (ft)	Rated discharge (ft³/s)	Temperature (°F)	Salinity (PSS-78)	Gauge height comments
9/14/2021 11:27 AM	4.130				

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**Measurement results**

Sta#	Time	Location (ft)	Method	Depth (ft)	%Depth	Measured Depth (ft)	Samples	Velocity (ft/s)	Correct on	Mean Velocity (ft/s)	Area (ft²)	Flow (ft³/s)	%Q	
0	11:09 AM	0.000	None	0.000	0.0000	0.000	0	0.0000		0.0239	0.0000	0.0000	0.00	✓
1	11:10 AM	1.000	0.6	0.600	0.6000	0.360	80	0.0239	1.0000	0.0239	0.6000	0.0143	2.49	✓
2	11:11 AM	2.000	0.6	0.750	0.6000	0.450	80	0.0728	1.0000	0.0728	0.7500	0.0546	9.51	✓
3	11:13 AM	3.000	0.6	0.800	0.6000	0.480	80	0.0772	1.0000	0.0772	0.8000	0.0618	10.77	✓
4	11:14 AM	4.000	0.6	0.850	0.6000	0.510	80	0.0787	1.0000	0.0787	0.8500	0.0669	11.65	✓
5	11:16 AM	5.000	0.6	0.950	0.6000	0.570	80	0.0845	1.0000	0.0845	0.9500	0.0803	13.99	✓
6	11:17 AM	6.000	0.6	1.000	0.6000	0.600	80	0.0812	1.0000	0.0812	1.0000	0.0812	14.16	✓
7	11:18 AM	7.000	0.6	1.000	0.6000	0.600	80	0.0652	1.0000	0.0652	1.0000	0.0652	11.35	✓
8	11:19 AM	8.000	0.6	1.000	0.6000	0.600	80	0.0576	1.0000	0.0576	1.0000	0.0576	10.03	✓
9	11:21 AM	9.000	0.6	0.900	0.6000	0.540	80	0.0667	1.0000	0.0667	0.9000	0.0600	10.46	✓
10	11:23 AM	10.000	0.6	0.700	0.6000	0.420	80	0.0228	1.0000	0.0228	0.7000	0.0159	2.78	✓
11	11:25 AM	11.000	0.6	0.500	0.6000	0.300	80	0.0323	1.0000	0.0323	0.5000	0.0162	2.82	✓
12	11:28 AM	12.000	None	0.000	0.0000	0.000	0	0.0000		0.0323	0.0000	0.0000	0.00	✓

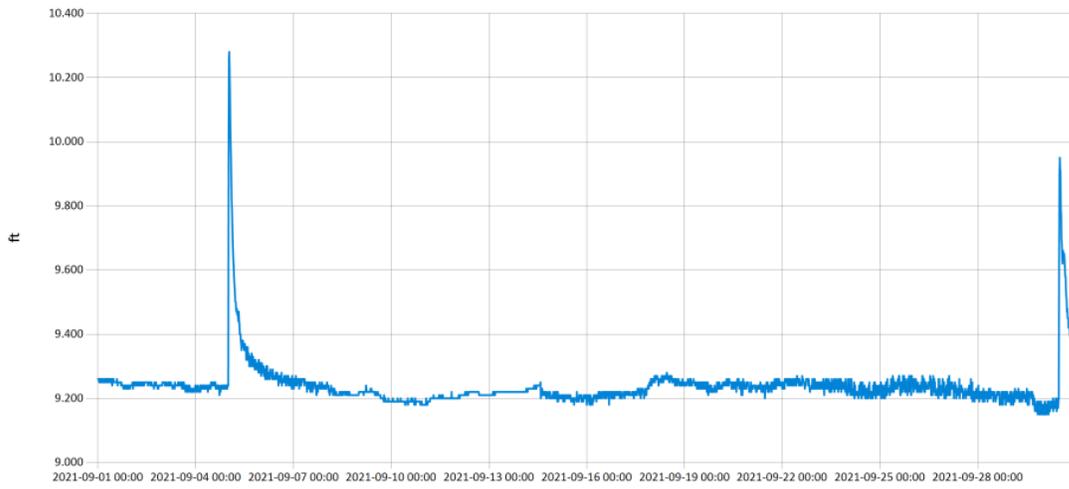
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**Quality control warnings**

Figure 2 Discharge Measurement Summary LRC-1

Period Selected: 2021-09-01 00:00 - 2021-09-30 23:59

UTC Offs et: -06:00

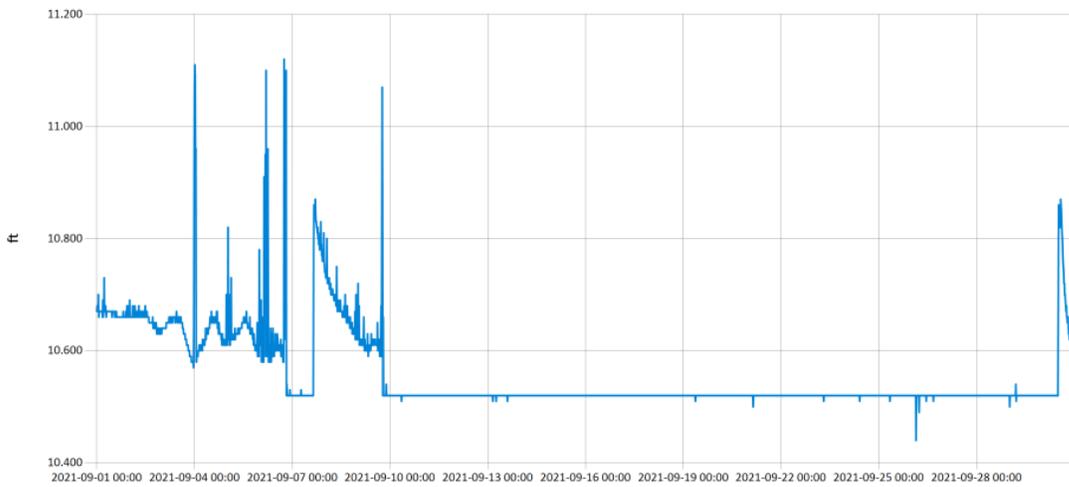


— Stage@TG

Figure 3 Monthly Hydrograph TG-1

Period Selected: 2021-09-01 00:00 - 2021-09-30 23:59

UTC Offs et: -06:00

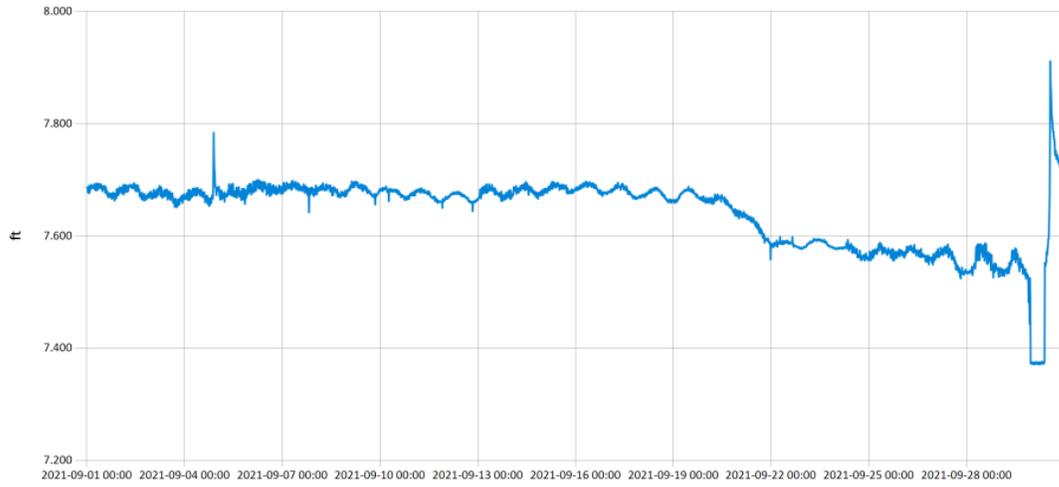


— Stage@TE

Figure 4 Monthly Hydrograph TE-1

Period Selected: 2021-09-01 00:00 - 2021-09-30 23:59

UTC Offs et: -06:00

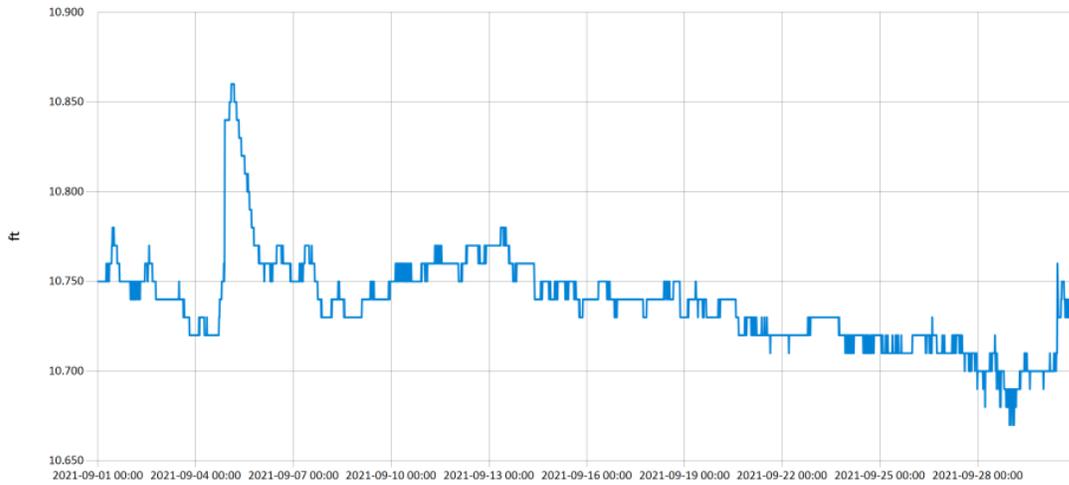


— Stage@WC

Figure 5 Monthly Hydrograph WC-1

Period Selected: 2021-09-01 00:00 - 2021-09-30 23:59

UTC Offs et: -06:00

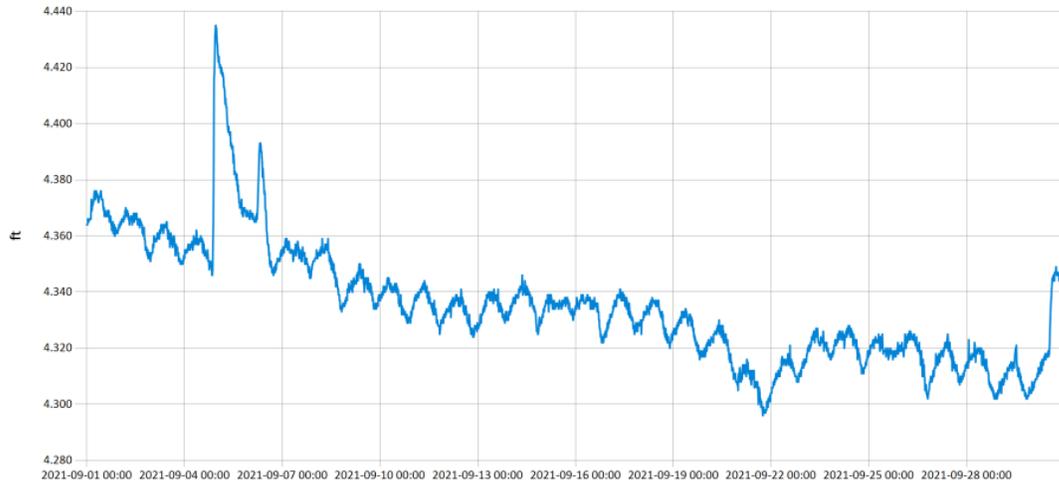


— Stage@URC

Figure 6 Monthly Hydrograph URC-2

Period Selected: 2021-09-01 00:00 - 2021-09-30 23:59

UTC Offs et: -06:00

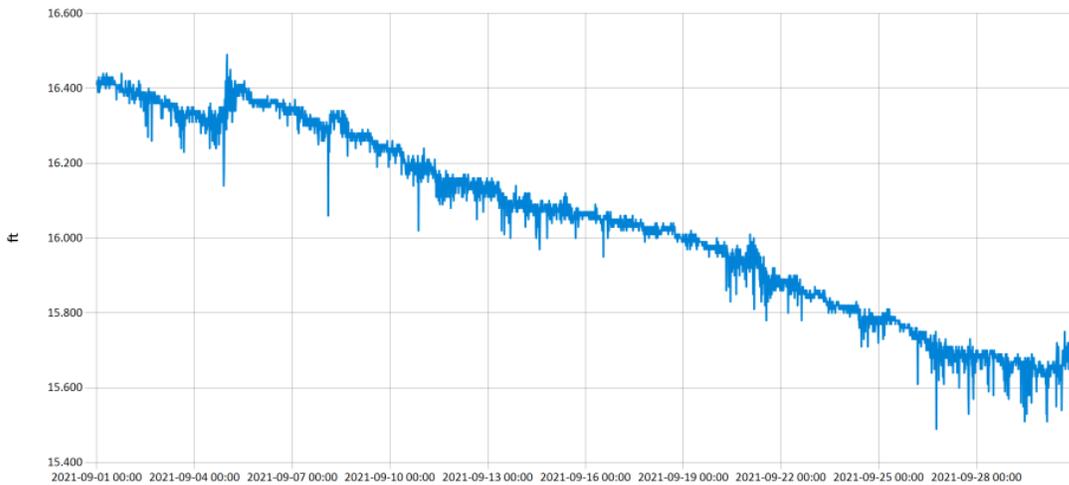


— Stage@LRC

Figure 7 Monthly Hydrograph LRC-1

Period Selected: 2021-09-01 00:00 - 2021-09-30 23:59

UTC Offs et: -06:00

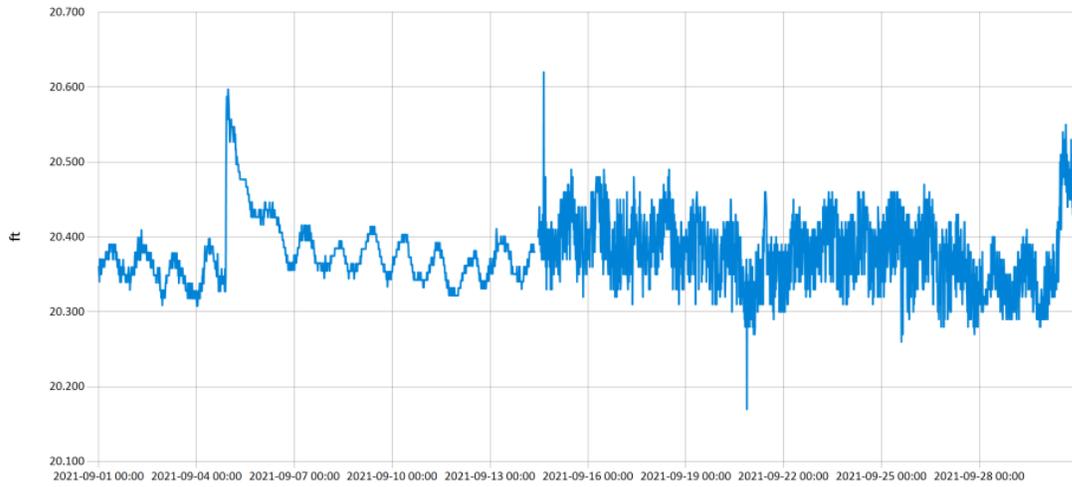


— Stage@LDB

Figure 8 Monthly Hydrograph LDB-1

Period Selected: 2021-09-01 00:00 - 2021-09-30 23:59

UTC Offs et: -06:00

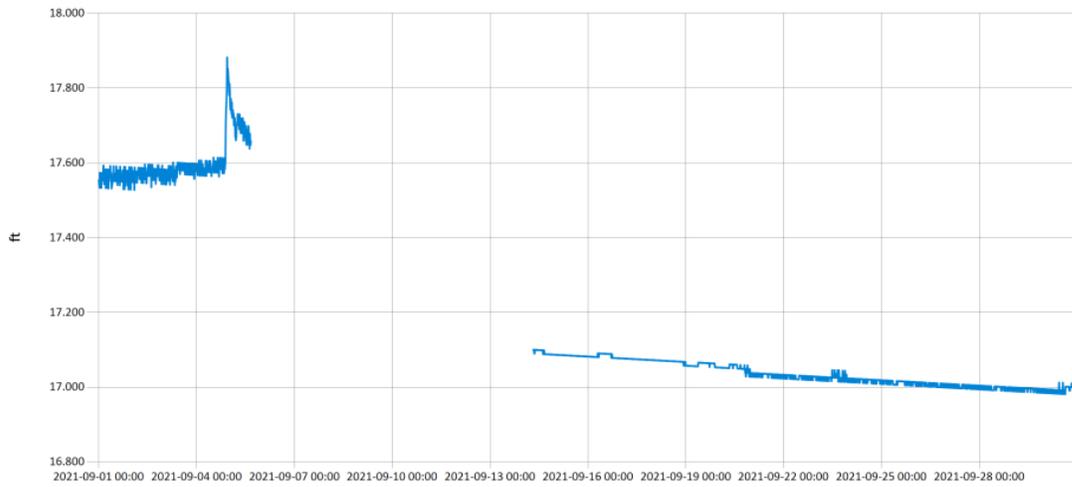


— Stage@CC

Figure 9 Monthly Hydrograph CC-1

Period Selected: 2021-09-01 00:00 - 2021-09-30 23:59

UTC Offs et: -06:00



— Stage@UDB

Figure 10 Monthly Hydrograph UDB-1

MESONET CLIMATOLOGICAL DATA SUMMARY				September 2021				Time Zone: Midnight-Midnight CST													
(NRMN) Norman				Nearest City: 2.1 NW Norman				County: Cleveland													
Latitude: 35-14-09				Longitude: 97-27-53				Elevation: 1171 feet													
DAY	TEMPERATURE ( °F )				DEG DAYS		HUMIDITY (%)			RAIN (in)		PRESSURE (in)		WIND SPEED (mph)		SOLAR (MJ/m <sup>2</sup> )	4" SOIL TEMPERATURES				
	MAX	MIN	AVG	DEWPT	HDD	CDD	MAX	MIN	AVG		STN	MSL	DIR	AVG	MAX		SOD	BARE	MAX	MIN	
1	98	75	86.0	69.1	0	21	82	33	60	0.00	28.58	29.82	S	5.8	17.4	22.34	81.8	88.8	96	82	
2	97	75	85.4	70.3	0	21	85	37	63	0.00	28.65	29.90	SSE	8.1	21.9	22.00	82.4	88.9	95	83	
3	97	76	85.3	70.1	0	21	87	41	63	0.00	28.68	29.92	S	9.1	24.9	22.09	82.5	88.8	95	83	
4	97	74	83.3	70.9	0	20	94	41	68	0.07	28.67	29.91	S	8.6	20.3	19.98	82.3	88.4	95	82	
5	88	68	77.6	66.4	0	13	95	40	71	0.00	28.75	29.99	NNE	7.6	17.8	21.24	81.0	86.1	92	81	
6	92	63	78.0	63.9	0	12	96	42	65	0.00	28.76	30.01	SSE	5.6	23.5	22.22	78.9	84.6	92	77	
7	95	68	81.7	64.1	0	16	76	40	57	0.00	28.68	29.93	S	8.0	22.1	22.24	79.5	85.1	92	78	
8	89	64	77.8	55.1	0	11	81	24	49	0.00	28.78	30.03	NE	8.5	23.0	22.76	79.1	85.2	91	80	
9	92	58	75.9	52.7	0	10	92	23	50	0.00	28.81	30.06	S	5.3	17.5	22.20	76.6	82.3	89	75	
10	92	65	78.6	53.8	0	14	65	26	45	0.00	28.78	30.03	S	9.5	28.7	19.10	76.8	81.6	87	76	
11	94	67	79.5	55.2	0	15	66	28	45	0.00	28.80	30.05	S	10.0	27.9	21.09	77.1	81.7	88	76	
12	91	64	77.4	56.7	0	12	77	29	52	0.00	28.83	30.08	S	8.4	21.3	21.19	77.1	81.3	87	75	
13	91	63	78.3	61.2	0	12	82	27	59	0.00	28.77	30.02	S	7.8	20.9	21.74	77.5	81.6	88	75	
14	90	68	78.9	64.0	0	14	87	40	63	0.00	28.70	29.95	S	8.0	20.8	21.56	78.5	82.8	89	77	
15	88	64	75.6	63.9	0	11	93	43	69	0.00	28.71	29.96	ESE	3.0	11.3	14.93	77.4	81.6	87	77	
16	91*	65*	79.1*	64.2*	0*	13*	92*	36*	63*	0.00*	28.69*	29.93*	SSE*	5.9*	18.5*	20.93*	77.7*	82.5*	90*	76*	
17	90*	69*	79.0*	64.5*	0*	15*	86*	41*	63*	0.00*	28.77*	30.02*	SSE*	5.4*	19.4*	NA	78.8*	83.8*	90*	78*	
18	92	65	78.7	61.8	0	13	92	32	60	0.00	28.82	30.07	NE	4.5	17.7	20.11	77.7	83.1	89	77	
19	93	66	80.2	63.8	0	15	90	34	61	0.00	28.68	29.93	SSE	6.0	19.9	21.13	78.1	83.5	90	77	
20	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00*	NA	NA	SSE*	NA	32.9*	NA	NA	NA	NA	NA	NA
21	81	58	70.2	44.7	0	4	68	19	43	0.00	28.96	30.22	N	15.5	35.4	22.06	75.2	80.4	84	76	
22	79	48	63.9	41.3	1	0	81	21	49	0.00	29.03	30.29	N	4.0	16.7	23.00	71.7	76.4	83	70	
23	84	50	68.1	42.2	0	2	86	21	44	0.00	28.84	30.09	SSE	6.0	18.3	22.19	70.8	75.4	83	68	
24	87	54	70.8	43.8	0	5	68	21	41	0.00	28.79	30.04	S	6.6	20.7	17.96	71.3	75.1	81	69	
25	89	55	72.3	49.1	0	7	76	24	48	0.00	28.84	30.09	SE	5.1	14.2	21.37	72.0	76.2	84	69	
26	92	63	76.6	49.1	0	12	64	19	41	0.00	28.76	30.01	S	8.8	28.9	21.30	73.3	77.5	84	71	
27	92	64	76.6	52.8	0	13	66	25	46	0.00	28.69	29.94	S	8.6	25.7	20.58	73.9	77.7	84	72	
28	93	67	77.8	60.8	0	15	78	35	58	0.00	28.61	29.85	SSE	8.4	26.0	18.83	75.5	79.3	86	73	
29	88	64	75.9	64.5	0	11	89	45	70	0.00	28.60	29.85	SE	9.5	22.8	18.96	76.2	79.6	85	75	
30	75	62	67.9	65.5	0	4	98	79	92	0.36	28.75	30.00	SE	7.0	24.5	2.82	74.2	75.2	79	71	
	90*	64*	77.1*	58.8*	<- Monthly Averages ->				28.75*	30.00*	S	*	7.4*	35.4*	20.28*	77.1*	81.9*	88*	76*		
Temperature - Highest: 98*					Degree Days - Total HDD: 1*					Number of Days With:											
Lowest: 48*					Total CDD: 355*					Tmax ≥ 90: 19*					Rainfall ≥ 0.01 inch: 2*						
Rainfall: Monthly Total: 0.43* in.					Humidity - Highest: 98*					Tmax ≤ 32: 0*					Rainfall ≥ 0.10 inch: 1*						
Greatest 24 Hr: 0.36* in.					Lowest: 19*					Tmin ≤ 32: 0*					Avg Wind Speed ≥ 10 mph: 2*						
										Tmin ≤ 0: 0*					Max Wind Speed ≥ 30 mph: 2*						

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\* Denotes incomplete record

Figure 11 September Mesonet Data